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Standard Specification for
COLD-DRAWN STEEL WIRE FOR CONCRETE REINFORCEMENT[1]

This standard is issued under the fixed designation A 82; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval.

This specification has been approved for use by agencies of the Department of Defense and for listing in the DoD Index of Specifications and Standards.

1. Scope

1.1 This specification covers cold-drawn steel wire to be used as such, or in fabricated form, for the reinforcement of concrete, in sizes not less than 0.080 in. (2.03 mm) in diameter.

NOTE 1—The values stated in inch-pound units are to be regarded as the standard.

2. Applicable Documents

2.1 *ASTM Standards:*

A 370 Methods and Definitions for Mechanical Testing of Steel Products[2]

A 700 Recommended Practices for Packaging, Marking, and Loading Methods for Steel Products for Domestic Shipment[3]

2.2 *Military Standards:*

MIL-STD-129 Marking for Shipment and Storage[4]

MIL-STD-163 Steel Mill Products Preparation for Shipment and Storage[4]

2.3 *Federal Standard:*

Fed. Std. No. 123 Marking for Shipments (Civil Agencies)[4]

3. General Requirements

3.1 When wire for concrete reinforcement is ordered by size number, the following relation between size number, diameter, and area shall apply, unless otherwise specified:

Size Number	Nominal Diameter, in. (mm)	Nominal Area, in.^{2} (mm^2)
W 31	0.628 (15.95)	0.310 (200.00)
W 30	0.618 (15.70)	0.300 (193.50)
W 28	0.597 (15.16)	0.280 (180.60)
W 26	0.575 (14.61)	0.260 (167.70)
W 24	0.553 (14.05)	0.240 (154.80)
W 22	0.529 (13.44)	0.220 (141.90)
W 20	0.505 (12.83)	0.200 (129.03)
W 18	0.479 (12.17)	0.180 (116.13)
W 16	0.451 (11.46)	0.160 (103.25)
W 14	0.422 (10.72)	0.140 (90.32)
W 12	0.391 (9.93)	0.120 (77.42)
W 10	0.357 (9.07)	0.100 (64.52)
W 8	0.319 (8.10)	0.080 (51.61)
W 7	0.299 (7.59)	0.070 (45.16)
W 6	0.276 (7.01)	0.060 (38.71)
W 5.5	0.265 (6.73)	0.055 (35.48)
W 5	0.252 (6.40)	0.050 (32.26)
W 4.5	0.239 (6.07)	0.045 (29.03)
W 4	0.226 (5.74)	0.040 (25.81)
W 3.5	0.211 (5.36)	0.035 (22.58)
W 3	0.195 (4.95)	0.030 (19.38)
W 2.5	0.178 (4.52)	0.025 (16.13)
W 2	0.160 (4.06)	0.020 (12.90)
W 1.5	0.138 (3.51)	0.015 (9.68)
W 1.2	0.124 (3.15)	0.012 (7.74)
W 1	0.113 (2.87)	0.010 (6.48)
W 0.5	0.080 (2.03)	0.005 (3.23)

4. Ordering Information

4.1 Orders for material to this specification shall include the following information:

4.1.1 Quantity (weight),

4.1.2 Name of material (cold-drawn steel wire for concrete reinforcement),

4.1.3 Wire size number,

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[1] This specification is under the jurisdiction of ASTM Committee A-1 on Steel, Stainless Steel and Related Alloys, and is the direct responsibility of Subcommittee A01.05 on Steel Reinforcement.

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[2] *Annual Book of ASTM Standards*, Parts 1, 2, 3, 4, 5, and 10.

[3] *Annual Book of ASTM Standards*, Parts 1, 3, 4, and 5.

[4] Available from Naval Publications and Forms Center, 5801 Tabor Ave., Philadelphia, Pa. 19120.

4.1.4 Packaging (see Section 11), and

4.1.5 ASTM designation and date of issue.

NOTE 2—A typical ordering description is as follows: 100 000 lb, cold-drawn steel wire for concrete reinforcement, size No. W 5, in 500-lb secured coils, in accordance with ASTM A 82 dated ______.

5. Process

5.1 The steel shall be made by one or more of the following processes: open-hearth, electric-furnace, or basic-oxygen.

5.2 The wire shall be cold drawn from rods that have been hot rolled from billets.

5.3 Unless otherwise specified, the wire shall be "as cold drawn," except wire smaller than size number W 1.2 for welded wire fabric, which shall be galvanized at finish size.

6. Physical Requirements

6.1 *Tension Tests*:

6.1.1 The material, except as specified in 6.1.2 shall conform to the tensile property requirements in Table 1, based on nominal area of wire.

6.1.2 For material to be used in the fabrication of welded fabric, the tensile and yield strength properties shall conform to the requirements given in Table 2, based on nominal area of the wire.

6.1.3 The yield strength shall be determined at an extension of 0.005 in./in. of gage length. The manufacturer is not required to test for yield strength, but is responsible for supplying a product that will meet the stipulated limit when tested in accordance with the provisions of 12.3.

6.1.4 The material shall not exhibit a definite yield point as evidenced by a distinct drop of the beam or halt in the gage of the testing machine prior to reaching ultimate tensile load. The purchaser may, at his option, accept this feature as sufficient evidence of compliance with the specified minimum yield strength to forego conducting the yield strength tests covered in 12.3.

6.2 *Bend Tests*—The bend test specimen shall stand being bent cold through 180° without cracking on the outside of the bent portion, as given in Table 3.

7. Test Specimens

7.1 Tension and bend test specimens shall be of the full section of the wire as drawn, or in the case of galvanized wire, as galvanized.

8. Number of Tests

8.1 One tension test and one bend test shall be made from each 10 tons (9072 kg) or less of each size of wire.

8.2 If any test specimen shows imperfections or develops flaws, it may be discarded and another specimen substituted.

9. Permissible Variation in Wire Diameter

9.1 The permissible variation in the diameter of the wire shall conform to the requirements given in Table 4.

9.2 The difference between the maximum and minimum diameters, as measured on any given cross section of the wire, shall be no more than the tolerances listed in Table 4 for the given wire size.

10. Finish

10.1 The wire shall be free of injurious imperfections and shall have a workmanlike finish.

10.2 Galvanized wire shall be completely covered in a workmanlike manner with a zinc coating, which is recognized in the industry as a "regular" coating.

10.3 Rust, surface seams, or surface irregularities on wire not intended for manufacture of fabric shall not be a cause for rejection provided the minimum dimensions and physical properties of a hand wire-brushed test specimen are not less than the requirements of this specification.

11. Packaging, Marking, and Shipping

11.1 The size of the wire, ASTM specification, and name or mark of the manufacturer shall be marked on a tag securely attached to each coil of wire.

11.2 When specified in the purchase order, packaging shall be in accordance with the procedures in Recommended Practices A 700.

11.3 *For Government Procurement Only*—When specified in the contract or order, and for direct procurement by or direct shipment to the U.S. government, material shall be preserved, packaged, and packed in accordance with the requirements of MIL-STD-163. The applicable levels shall be as specified in the contract. Marking for shipment of such material shall be in accordance with Fed. Std. No. 123 for civil agencies and MIL-STD-129 for military agencies.

12. Inspection

12.1 The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works that concern the manufacture of the material ordered. The manufacturer shall afford the inspector all reasonable facilities to satisfy him that the material is being furnished in accordance with this specification.

12.2 Except for yield strength, all tests and inspection shall be made at the place of manufacture prior to shipment, unless otherwise specified. Such tests shall be so conducted as not to interfere unnecessarily with the operation of the works.

12.3 If the purchaser considers it desirable to determine compliance with the yield strength requirements in 6.1, he may have yield strength tests made in a recognized laboratory, or his representative may make the test at the mill if such tests do not interfere unnecessarily with the mill operations.

12.4 *For Government Procurement Only*—Except as otherwise specified in the contract, the contractor is responsible for the performance of all inspection and test requirements specified herein. Except as otherwise specified in the contract, the contractor may use his own or any other suitable facilities for the performance of the inspection and test requirements specified herein, unless disapproved by the purchaser at the time of purchase. The purchaser shall have the right to perform any of the inspections and tests at the same frequency as set forth in this specification where such inspections are deemed necessary to assure that material conforms to prescribed requirements.

13. Rejection

13.1 Material that shows injurious imperfections subsequent to its acceptance at the manufacturer's works will be rejected, and the manufacturer shall be notified.

TABLE 1 Tension Test Requirements

Tensile strength, min, ksi (MPa)	80 (550)
Yield strength, min, ksi (MPa)	70 (485)
Reduction of area, min, percent	30[A]

[A] For material testing over 100 ksi tensile strength, the reduction of area shall be not less than 25 percent.

TABLE 2 Tension Test Requirements (Material for Welded Fabric)

	Size W1.2 and Larger	Smaller than Size W1.2
Tensile strength, min, ksi (MPa)	75 (517)	70 (483)
Yield strength, min, ksi (MPa)	65 (448)	56 (386)

TABLE 3 Bend Test Requirements

Size Number of Wire	Bend Test
W7 and smaller	Bend around a pin the diameter of which is equal to the diameter of the specimen
Larger than W7	Bend around a pin the diameter of which is equal to twice the diameter of the specimen

TABLE 4 Permissible Variation in Wire Diameter

Size Number	Nominal Diameter, in. (mm)	Permissible Variation plus and minus, in. (mm)
Smaller than W5	Under 0.252 (6.40)	0.003 (0.08)
W5 to W12, incl	0.252 (6.40) to 0.391 (9.93), incl	0.004 (0.10)
Over W12 to W20 incl	Over 0.391 (9.93) to 0.505 (12.83) incl	0.006 (0.15)
Over W20	Over 0.505 (12.83)	0.008 (0.20)

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